to me this morning 21 inches long, in which the matured ova can be felt by pressure on the abdomen: I retain it therefore uninjured. This almost brings the time up to the period when I obtained the ova last year, so that it would appear that from January to May, rather than at two distinct periods, these fishes deposit their ova.

LII.—*Generic Characters of* Gasterochisma melampus, *a Fish which inhabits Port Nicholson, New Zealand.* By John Richardson, M.D., F.R.S. &c., Medical Inspector of Naval Hospitals at Haslar.

Piscis familiæ Scomberidarum.

Corpus valde compressum, clupeiforme. Cauda gracilis sine carinis. Venter acutus, alte diffissus et in vagina ejus pinnas ventrales thoracicas magnas recondens.

Linea lateralis inermis.

Pinnæ pectoris parvæ. Pinnæ dorsi contiguæ: prima spinis gracilibus membrana connexis instructa; secunda pinnaque ani pinnulis spuriis comitatæ. Pinna caudæ bifurca.

Anus parvus sub finem vaginæ ventralis latens.

Squamæ teneræ satis magnæ. Pectorale squameum nullum.

Dentes parvi setacei.

Radii membranæ branchiostegæ arctæ quinque.

Apertura branchialis ampla.

Obs. Species unica adhuc detecta *Gasterochisma melampus* in Museo Britannico hospitatur et a Domino Gray celeberrimo mihi benigne communicata. Nomen genericum fissuram ventris denotat.

BIBLIOGRAPHICAL NOTICES.

Recherches sur l'Embryogénie des Tubulaires, et l'Histoire naturelle des différens Genres de cette Famille qui habitent la côte d'Ostende. Par P.-J. Van Beneden, Professeur à l'Université catholique de Louvain. (From the Mémoires de l'Académie Royale de Bruxelles. 4to. Pp. 72. Six Plates.)

This interesting essay supports the well-earned reputation of its distinguished author. It begins with a lucid and candid review of what had been previously done by other naturalists towards a history of the family; a doubt of the correctness of some alleged fact being sometimes interposed, but more frequently the comment is made to reconcile observations which at first view are apparently contradictory and subversive of each other.

We can do little more than indicate the contents. The first chapter treats of the anatomy of the *Tubulariæ*. The tentacula are solid and composed of cells arranged somewhat after the pattern of the cellular tissue of vegetables. They are not organs of prehension as in the *Hydræ*, but are probably subservient to respiration. In the *Eudendrium* they are the only parts of the polyp which come into

direct contact with the circumfluent water; and when this is at rest, all *Tubulariæ* spread wide their tentacular circle. But they are not the sole organs of this function, for we may safely suppose that the water, in penetrating into the common cavity of the polypidom, carries with it the necessary oxygen. In these animals in fact the functions of respiration and nutrition are so simple, and so intimately blended with the circulation, that we can scarcely use separate terms in defining them.

The stomach of every individual polyp communicates with the cavity common to all the polyps of the same polypidom, the line of separation being marked only by a sort of stricture; but in *Coryne* this is not the case, for the stomach of every individual is isolated and distinct.

The circulation of the granulous fluid in the common tube of the polyps, first described by Mr. Lister, Van Beneden is inclined to ascribe to the action of vibratile cilia, which, he admits, he could not detect. The irregularity or inconstancy of this circulation seems to us to be opposed to this explanation; nor do we perceive any fitting basis on which the cilia can be placed. A portion of the tube of a *Eudendrium*, some lines in length, being cut away, and consequently open at both ends, preserved its circulating power, the liquid moving in its normal course. Lister says that the current does not penetrate into the body or stomach of the polyp, but Van Beneden has plainly seen it do so. In *Coryne* and *Hydractinia* there is no circulation, because of the isolation of the stomach in these genera.

The second chapter, and principal part of the paper, describes the "embryogeny." The origin and development of the reproductive buds and eggs are traced with great minuteness, and illustrated with a series of admirably explanatory figures. There is no distinction of sex in the *Tubulariæ*; and nothing analogous to spermatozoa, notwithstanding what has been said to the contrary. The reproductive buds, which originate from the bases of the tentacula, are hollow in the centre in all the genera, and always communicate with the digestive cavity. What have been mistaken for females are young individuals, which often contain eggs at an early stage even of their development.

The *Tubulariæ* are reproduced (1.) by a bud continuous with the animal whence it pullulates; (2.) by a free or locomotive bud; (3.) by a simple egg; (4.) by a compound egg or vitellus; and (5.) by a free bud and eggs simultaneously. Every species may be reproduced by more than one or two of these modes, but it does not appear that any has been observed to reproduce itself by all of them.

The first or gemmiparous reproduction is the simplest. By it the embryo, after having become fixed in a proper site, evolves new individuals, and founds a colony where all are associated together.

2. The free bud originates near the tentacula. It appears at first as a simple tubercle which soon divides successively into several tubular branchlets, in which a circulation goes on as in the main stems. Within the swollen apex of each branchlet a distinct cell soon appears, indicating the commencement of the formation of a new being. This

cell may be considered as the analogue of the yolk or rather of the vesicle of Purkinje or of Wagner. It enlarges rapidly; and soon there is distinguishable underneath it a membrane which has its inferior surface in contact with the circulating fluid. This membrane is the source of the new polyp, the progress of which onwards from a little cone to the time when it has assumed the form of a *Beroë*, and is detached from its matrix and floats at freedom in the sea, is most interestingly told. Van Beneden has not seen this nomade *Beroë* refix itself, but he has seen it very soon afterwards; and its transition from the condition and shape of a medusa to that of its parent polyp appears as an uninterrupted sequence of development. He has never discovered cilia on the young embryo, nor any organs of sense.

3. The development from a simple egg is the most regular, and the process which approaches nearest to that of the superior animals.

4. The development from a compound or divided yolk is the most remarkable; but when it is remembered that, in these polyps, every portion of the body can give origin to a new individual, we need be the less surprised to find that the vitellus should have the same quality. At first the process in the primary cell agrees with the other developments, but a time comes when the surface of the vitelline mass assumes an embossed or granular appearance, and instead of a single vitellus there are as many as there are granules. In each of these there is the vesicle of Purkinje, or at least a transparent central vesicle. It seems that the embryos thus formed differ from the others not only in bulk but also in shape, for in *Campanularia* M. Lovén has seen them, covered with cilia, leave their cell, and move about like infusorial animalcules.

5. This is the union of two of the preceding modes; the formation at one and the same time of a free bud and of a compound vitellus organizing itself in the interior of this bud. It is the fact of these buds containing these vitelli that has made them be taken for pregnant females. The eggs here, according to Lovén, are covered with cilia; and when the embryo is born (for we should remember that the polyps are viviparous) it has the aspect of a *Planaria*,—the planule of Sir J. G. Dalzell.

Van Beneden next proceeds to prove, by a comparison of their common resemblances, that the *Campanulariæ* and *Tubulariæ* are so nearly related that they may almost be considered as members of the same family.

Lastly, he reviews the family zoologically, giving its character in detail, and the characters of the genera and species which he has observed. This view has been already given in the 'Annals.' We need only remark that his *Tubularia calamaris* is really not the *T. calamaris* of Pallas or *T. indivisa* of Linnæus; and his *T. Dumortierii* is a common British species. M. de Blainville is not the first of modern authors who recognised that the *Syncoryne* ought to be placed near the *Tubulariæ* (p. 51), as any one may see by referring to Loudon's 'Magazine of Nat. History,' vol. v. p. 632. We question the validity of the distinction between *Syncoryne pusilla* and *Listerii*; they are both British species, but the latter is the commonest. Van

Beneden's *Eudendrium ramosum* appears to us to be different from the species usually so designated, and a new species. The polyp on which Mr. Hassall founds his genus *Echinocorium* must, we think, be referred to Van Beneden's genus *Hydractinia*, and is perhaps the same as his *H. lactea*.

Such is our hurried notice of this valuable essay, which, it is to be regretted, cannot be procured in a separate form. But we look forward to the time—its object being better understood—when, by means of the Ray Society, essays of this high degree of excellence shall be diffused amongst us widely.

Mycologia Britannica, or Specimens of British Fungi.
By Ph. B. Ayres, M.D. W. Pamplin, 1844.

This is a welcome addition, especially to the admirers of Epiphyllous Fungi, to the various collections of Fungi which have been published in this and other countries. It is not at all probable that Mr. Berkeley's 'British Fungi' will be continued beyond the Fourth Fasciculus; we shall be rejoiced therefore if the present work should be encouraged sufficiently to ensure its continuance, so that it may take its place. The specimens are neatly prepared and correctly named, and we doubt not that in future numbers they will not be so much confined to a single division. *Æcidium Galiatum*, DeC., and *Æ. Scrophulariæ*, DeC., are new to our flora, and *Æ. pallidum*, a pretty species on *Galium Aparine*, has been hitherto unnoticed. The specimens, fifty in number, are so arranged that they can at pleasure be transferred to the herbarium.

PREPARING FOR PUBLICATION,

A work to be entitled, Fauna Antiqua Sivalensis, being the Fossil Zoology of the Sewalik Hills, in the North of India. By Hugh Falconer, M.D., F.R.S., F.L.S., F.G.S., and Proby T. Cautley, F.G.S.

The object of this publication is to make known, in a connected and complete series, the numerous fossil animals which have been discovered in the North of India, by the authors and other inquirers, during the last twelve years; and to develope the bearings of these discoveries on the physical and geological history of India during a great part of the tertiary period.

In order to secure to science the full advantage of the Sewalik fossil researches, in a suitable form of publication, Her Majesty's Government and the Honourable Court of Directors of the East India Company have been pleased to accord such an amount of aid *in limine* as will ensure the successful progress of the work.

The work will appear in about Twelve Parts, to be published at intervals of about four months, each containing from twelve to fifteen folio plates, or an equivalent number of a larger size where the nature of the subject may require it. The plates to be accompanied by royal octavo letter-press.

PROCEEDINGS OF LEARNED SOCIETIES.

BOTANICAL SOCIETY OF EDINBURGH.

Feb. 13, 1845.—Dr. Douglas Maclagan, President, in the Chair.

Dr. Herman Hoffmann, Giessen, was elected a Foreign Member of the Society.

Various donations to the Library and Museum were announced, and the following communications were read :—

1. Dr. Seller read a paper entitled "Examination of the Views adopted by Liebig on the Nutrition of Plants."

He contrasted Liebig's view of the mineral nature of the food of plants with that which represents their food as organic. He traced out the consequences deducible from this last hypothesis as affecting not merely the vegetable but the animal kingdom also, the latter being ultimately sustained solely by vegetable substances. He showed that, whereas the view adopted by Liebig nowise restricts the duration of the organized kingdoms, as long as they remain exempt from the influence of destructive agencies from without, the opposite view involves the conclusion, that the whole of organic nature is hastening rapidly to dissolution from inherent causes; and he affirmed, that were certain data somewhat more carefully considered, the period of the final extinction of plants and animals, in accordance with this hypothesis, might be pretty nearly determined. He regarded this question as one not merely of high interest in itself, but as bearing expressly on the solution of the problem, whether the food of plants be organic or mineral.

Dr. Seller calculates the annual conversion of the carbon of organic matter into inorganic carbonic acid at not less than 600 millions of tons; and infers, on the most favourable aspect of the amount of soil over the earth's surface, that such an annual loss could not be withstood beyond 6000 years; and, on a less exaggerated assumption of its amount, probably very near the truth, that the waste would absorb the whole of the existing organic matter of the soil in about 740 years.

Dr. Seller contends that the truth of these conclusions remains unaltered, even if it be conceded that much of the carbon of plants is drawn, not from the organic matter of the soil but from the inorganic carbonic acid of the atmosphere, unless some inorganic source of their hydrogen and oxygen be at the same time admitted. He therefore regards Liebig's view of the inorganic nature of the food of plants as supported not merely by many special facts—for example, by the increase of the organic matter of the soil, often observed during the growth of plants,—but also by the general view of the earth's surface just taken, because there is nothing in its aspect to warrant the idea that its means of maintaining the organic kingdoms are declining with the rapidity indicated in the statements just made.

Dr. Seller next examined Liebig's views of ammonia; 1st. as the sole source of the nitrogen of plants, and thereby of animals; 2nd,

as having its exclusive origin from the interior of the earth, and never from the nitrogen of the atmosphere. In regard to these statements he made it appear, as there is no evidence of ammonia being thrown forth from the bowels of the earth at all times in quantity proportioned to the waste of it necessarily sustained at the surface by decomposition, as into uncombined hydrogen and nitrogen, that Liebig's view of ammonia infers the same limitation of the existence of the organic kingdoms to a few thousand years, as is deduced from the hypothesis of organic matter being the food of plants. Here therefore he dissented from Liebig, contending that ammonia must be produced from the nitrogen of the atmosphere*, and showing the probability of what is taught by Professor Johnson, namely, that the nitrogen of nitrates, formed from the atmosphere, is fixed by plants, as well as the nitrogen of ammonia.

In conclusion, he reviewed the evidence of potassa, the phosphates and the other saline matters of both organic kingdoms being derived originally from the crumbling of rocks, and dwelt on the retardation of vegetable physiology by the long scepticism of botanists on this head, owing, as he believed, to their distrust in the conclusions of chemistry, and went on to show that chemistry must be the groundwork of vegetable physiology in its present stage, and that the frequent changes in the aspect and nomenclature of chemistry did not materially affect the facts which it daily affords for the elucidation of the vegetable œconomy.

2. A paper by Mr. Ralfs, of Penzance, on the genus *Closterium* was read. This paper will shortly appear in the 'Annals and Magazine of Natural History.'

3. Mr. M'Nab read a continuation of his Journal of a Tour through part of the United States and the Canadas. The last portion read before the Society gave an account of the journey from Montreal to Kingston, and concluded with an account of a botanical excursion to the eastward of the latter place:—

The woods to the westward of Kingston appeared very dense, chiefly consisting of stately beeches, growing in rich vegetable soil. Several very remarkable plants were observed, and among others the *Monotropa uniflora* and *M. Hypopitys*: the former, which is abundant in shady beech woods throughout the country, and always growing from amongst leaves, is known to the inhabitants by the name of Indian pipe or bird's-nest; the latter is not so plentiful, but found in similar situations. Here also *Corallorhiza multiflora* and *Orobanche virginica* were found, and at one place in a dense thicket the rare and curious *Pterospora Andromeda*.

Near the confines of the woods in drier situations the white and pink varieties of *Phryma leptostachya* occurred; and on the dry limestone ridges, which prevail in this neighbourhood, large quantities of *Triosteum perfoliatum*, *Gnaphalium margaritaceum*, and *Botrychium obliquum* were found; along the margin of Lake Ontario *Serpicola verticillata* was noticed, its delicate flowers floating on the surface.

* This has been clearly proved by the experiments of Prof. Mulder: see 'Chemical Gazette' for Jan. 1, 1845.—W. F.

The beech, sugar, maple and white pine, from their quantity and local situation, seem to have been the original inhabitants of this district; and mixed with them, but not so much in groups, were noble specimens of the oak, elm and walnut. The sugar-maples bore evident marks of having been often pierced for their juices. Fringing the edges of some meadow-land in this district, the stag's-horn sumach, *Rhus elegans*, presented a most magnificent appearance from the quantity of scarlet fruit.

He was agreeably surprised to see such a variety of native hawthorns, being convinced of their fitness for forming hedges, so very much wanted in that country, and for which many of the inhabitants expressed a great desire, instead of the unsightly snake fences which at present separate the fields. Apparently they never thought that the indigenous thorns would answer for this purpose, as they talked of importing haws and white-thorns from Britain. Mr. M'Nab gave instructions to those individuals with whom he had an opportunity of conversing upon the subject, so that they may raise thorns for themselves, as an abundant supply of seeds may be annually procured at no great distance from each settlement. As these instructions may be interesting to others, we here repeat them :—

"The fruit should be gathered about the end of October, care being taken to keep the seeds of the luxuriant growing sorts separate from those of the dwarfer kinds. A pit should be prepared about a foot and a half deep, into which the fruit is to be put with a mixture of earth or sand. It should be turned several times during the season, and if dry, a little water may be added; one or two inches of soil being a sufficient covering to ensure the decomposition of the pulp. During the following October a piece of good ground should be prepared, and the seed sown as it is taken from the pit, pretty thickly, in drills about a foot distant from each other, or in beds 3 feet wide. In the succeeding spring the plants will begin to appear; at which time, and throughout the season, they must be kept clear of weeds. If properly attended to, the seedlings will attain a height of from 6 to 12 inches the first year. The following spring the strongest plants may be either transplanted into drills, or placed where they are intended to remain as a permanent fence. The smaller ones should be left in the seed drills or beds for another year, when they may be treated in the same manner. In forming a live fence, the ground ought to be prepared as soon as the snow disappears, by making a trench about 2 feet broad and a spade in depth. Along the centre of this trench the young plants should be put about 6 or 8 inches apart, and afterwards well-watered and firmly trodden in. Care should be taken to protect the young plants from cattle and clear of weeds.

"The second year after planting, the thorns should be headed down to within six or ten inches of the ground, and each year afterwards switched up on both sides to a centre ridge, so as to produce the shape generally termed sow-backed; hedges trained in this form being less liable to be destroyed by snow resting upon them than when cut flat at the top."

If the method here recommended be properly attended to, Mr. M'Nab has not the least hesitation in saying that an excellent hedge of native thorns may be acquired in five or six years after planting. At several places he saw the indigenous thorns employed as a fence; at least they had been planted with that intention, and had attained a considerable height, but from want of proper attention to pruning and weeding, they were so slender that easy access might be obtained between each stem. From such instances of mismanagement, an erroneous opinion seems generally to prevail that hedges will not succeed in America. "But," he very properly remarked, "if newly-planted hedges in Britain were equally neglected, there can be no doubt that they would soon degenerate, and become no better than those which I observed in the United States and the Canadas."

March 13.—Dr. Seller, V.P., in the Chair.

Robert Balloch, Esq., Glasgow, was elected a Non-resident Fellow of the Society.

Numerous donations to the Library and Museum were announced, particularly from R. J. Shuttleworth, Esq., Berne, a collection of North American plants, and the 14th Fasciculus of Meisner's Plantarum Vascularum Genera; from the Imperial Academy, Naturæ Curiosorum of Breslau, the Supplement to vol. xix., and parts 1st and 2nd of vol. xx. of the 'Nova Acta'; from Professor Graham, plants collected in Jamaica by Dr. G. M'Nab; from H. C. Watson, Esq., his Botany of the Azores; from Mr. William Gardiner, jun., Dundee, Botanical Rambles in Braemar, &c. Dr. Parnell presented a copy of his beautiful work on the Grasses of Britain. The thanks of the Society were voted to the respective donors.

The following communications were read:—

1. "On the genus *Closterium* (continued)," by Mr. J. Ralfs, of Penzance.

2. "On *Encyonema prostratum* of Kützing," by the same. These papers will appear in the 'Annals of Natural History.'

3. Mr. M'Nab read a continuation of his Journal of a Tour through part of the United States and Canada. The last portion of this journal read before the Society chiefly related to the botanical aspect of the country immediately to the westward of Kingston; the indigenous thorns and their fitness for forming hedges being particularly described. From Kingston the party crossed Lake Ontario to Rochester, situated on the American side, a few miles above the mouth of the Genessee river. Considerable tracts of shallow water extend for some distance on either side of this river, in which the wild rice grew more luxuriantly than had been hitherto observed. Proceeding upwards the river becomes narrower but deep, having beautiful banks rising about 150 feet on either side, wooded chiefly with oak, elm, hiccory, beech and birch, interspersed with hemlock spruce, white pine and arbor vitæ of large size. On the north bank the black snake-root, *Actæa ramosa*, was abundant, its long spikes of white flowers having a singular effect beneath the shade of the trees. It